

# Visual expertise development; the case of medical diagnosis

Citation for published version (APA):

Jarodzka, H. (2012). *Visual expertise development; the case of medical diagnosis*. Paper presented at EARLI Sig 14 "Learning and Professional Development", Antwerp, Belgium.

## Document status and date:

Published: 01/08/2012

## Document Version:

Peer reviewed version

## Document license:

CC BY-NC-ND

## Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

## General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

<https://www.ou.nl/taverne-agreement>

## Take down policy

If you believe that this document breaches copyright please contact us at:

[pure-support@ou.nl](mailto:pure-support@ou.nl)

providing details and we will investigate your claim.

Downloaded from <https://research.ou.nl/> on date: 04 May. 2023

**Open Universiteit**  
[www.ou.nl](http://www.ou.nl)



**Abstract submission EARLI Special Interest Group 14**  
**Learning and Professional Development – Symposium**

**Overview**

---

**Visual expertise development; the case of medical diagnosis**

In many professional domains, such as air traffic control (Van Meeuwen et al., 2011), fine arts (Vogt & Magnusen, 2007), car driving (Huestegge, et al., 2010), marine zoology (Jarodzka et al., 2010), and many more, expertise requires the ability to examine complex, information-dense, visual material. This is in particular true for the medical domain (e.g., fMRI, echoscopy). Such visual material poses peculiar challenges to the perceptual and cognitive system. In particular, inexperienced individuals face difficulties, as they rather attend to visually salient, instead of thematically relevant information (Jarodzka et al., 2010; Landsdale et al., 2010). To that point, little is known on how that perceptual system develops and adapts with growing expertise in medicine, let alone that we know how the learning process can be accelerated or otherwise improved. The most convenient way to study this perceptual system directly is by means of eye tracking, which is a method to measure the movements of the eyes and relate them to a stimulus to infer to which information a person attended to, for how long and in which order (Holmqvist et al., 2011). Research that has been conducted on expertise differences in viewing medical images (for an overview see Krupinski, 2010), investigated only simplistic medical images (mainly grayscale X-ray stills of the chest) with few participants. Hence, even though these studies provide first insights into some aspects of visual expertise, they hardly capture the full complexity of the different medical professions.

In this symposium, three studies took up the challenge to investigate visual expertise as it is required in nowadays medical practice by making use of high-end eye tracking equipment to capture perceptual processes and their development in detail. The first study, investigated digital microscopy, which is a state-of-the-art imaging technique that allows the physician to interactively navigate through tissue. Furthermore, this study tackles the missing link between research on cognitive aspects of medical expertise (Schmidt & Boshuizen, 1993) and its visual aspects (Krupinski, 2010) by recording both processes and analyzing them combined. The second study also focused on state-of-the-art imaging techniques, namely positron emission tomography (PET). In this domain, the authors compared four different expertise levels and showed that visual expertise develops on this medical domain not linearly, but rather in a U-shape manner. On top of that, this study compares findings from PET with a more traditional domain within eye tracking research, namely radiology. The third study again investigates novel medical imaging techniques, namely videos of CT scans. In that, this study also tackles a hot-topic in eye movement research, namely the perception of dynamic scenes and how this can be analyzed (cf. Holmqvist et al., 2011). Moreover, this study examines in what speed this new imaging technique should be presented to enable medical experts to unfold their exceptional performance.

All studies will be discussed in the light of theories on cognitive structures underlying medical expertise development (Schmidt & Boshuizen, 1993) and how these can be extended to their visual counterparts.

## References

- Holmqvist, K., Nyström, M., Andersson, R., Dewhurst, R., Jarodzka, H., & Van de Weijer, J. (2011). Eye tracking: A comprehensive guide to methods and measures. *Eye tracking: A comprehensive guide to methods and measures*. Oxford, UK: Oxford University Press.
- Huestegge, L., Skottke, E.-M., Anders, S., Müsseler, J., & Debus, G. (2010). The development of hazard perception: Dissociation of visual orientation and hazard processing. *Transportation Research Part F: Traffic Psychology and Behaviour*, 13(1), 1-8.
- Jarodzka, H., Scheiter, K., Gerjets, P., & Van Gog, T. (2010). In the eyes of the beholder: How experts and novices interpret dynamic stimuli. *Learning and Instruction*, 20, 146–154.
- Krupinski, E. (2010). Current perspectives in medical image perception. *Attention, Perception, & Psychophysics*, 72(5), 1205-1217.
- Lansdale, M., Underwood, G., & Davies, C. (2010). Something overlooked? How experts in change detection use visual saliency. *Applied Cognitive Psychology*, 24(2), 213-225.
- Schmidt, H. G., & Boshuizen, H. P. A. (1993). On the origin of intermediate effects in clinical case recall. *Memory and Cognition*, 21, 338-351.
- Van Meeuwen, L. W., Jarodzka, H., Brand-Gruwel, S., Kirschner, P. A., De Bock, J. J. P. R., & Van Merriënboer, J. J. G. (2011). Expertise development for a visual task: Eye movements, verbal reports, and spatial abilities in air traffic control. *Journal of Eye Movement Research*, 4(3), 199.
- Vogt, S., & Magnussen, S. (2007). Expertise in pictorial perception: Eye movement patterns and visual memory in artists and laymen. *Perception*, 36, 91-100.

### Chairperson:

**Dr. Halszka Jarodzka (Open University of the Netherlands / CELSTEC)**

### Discussant:

**Prof. H. P. A. Boshuizen (Open University of the Netherlands / CELSTEC)**